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Claims 1-64 have been cancelled

65. (Currently Amended) A vehicle occupant seat detection means and weight responsive ~~classification system for controlling the resistance of a~~ supplemental restraint device of a vehicle; comprising:

at least one seat ~~including~~ configured with at least a seat mounting structure;

at least one weight sensing unit ~~being~~ operatively secured beneath said at least one seat of a vehicle;

at least a computerized system communicatively connecting said weight sensing unit to a supplemental restraint system installed in said vehicle, said supplemental restraint system comprising at least one airbag system each ~~said at least one airbag system~~ having at least one airbag, each said airbag system corresponding to said one of said at least one seat;

said at least one weight sensing unit being configured for taking weight measurements of at least one ~~seated~~ occupant in said at least one seat~~, further comprising apparatus for~~ and converting said weight measurements into ~~varying electrical resistance comprising~~ one or more electrical signals, and communicating said electrical signals to said at least one computerized system;

said at least one computerized system being programmably configured to calculate at least an operating weight value from said electrical signals corresponding to said weight measurements for each said at least one seated occupant and communicating said operating weight value to said airbag system corresponding to said one of said at least one seat;

each said airbag system being operatively configured ~~with at least an accelerometer, said accelerometer comprises at least a coil being configured~~ for receiving said operating weight value for said at least one seat and for adjusting a deployment unit within said airbag system to deploy said at least one airbag with a deployment force and acceleration for airbag inflation that are proportionate to said weight measurements;

at least ~~an erasable programmable read only memory "EPROM" being~~ a memory device being operable for monitoring the weight on said ~~of~~ at least one seat ~~a seated occupant~~ and for correcting the weight of at least a changing occupant; and

said weight sensing unit responsive to ~~the actual~~ said weight of said at least one ~~seated occupant~~ seat, wherein said airbag system is rendered of sufficient deployment force and acceleration for said airbag inflation to keep said at least one seated occupant on said at least one seat when a collision is sensed, but is not rendered of sufficient deployment force and acceleration for said airbag inflation to cause impact injury to ~~the~~ said at least one seated occupant.

66. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65, wherein said weight sensing unit comprises at least a load cell mounted between said seat mounting structure and the vehicle floor.

67. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 66, wherein said load cell is configured with at least a strain gauge ~~being operable for exhibiting varying~~ comprising electrical resistance elements.

68. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65, wherein said memory device further comprises at least an EPROM being operable with said at least one computerized system and responsive to classified data for said at least one seated occupant.

69. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 68, wherein said at least one computerized system further comprises at least one of: an emulator; a processor; an address line; a memory device; software program; a CPU; a CMOS.

70. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 69, wherein said ~~EPROM~~ at least one computerized system being

communicatively configured ~~connected to said emulator~~ for correcting ~~changing~~ data about a changing occupant, wherein said weight sensing unit ~~being~~ further configured for sensing weight and for generating a weight signal corresponding to the weight of said ~~at least one seated~~ occupant.

71. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 67, wherein said load cell being operatively configured with said supplemental restraint system ~~being operable~~ in communication with said at least one computerized system operable for adjusting the deployment force/speed of said airbag system for said at leas one seat.

72. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 69, wherein said ~~EPROM~~ at least one computerized system further comprising a header being communicatively connected to a circuit board being operatively configured ~~with said emulator~~ to run programs and process data, said EPROM being operable for comparing identified weight data ~~for said at least one seated occupant~~ and generating at least a new data if said comparison is significantly different.

73. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 66, wherein said load cell ~~being~~ further configured to measure resistance occurring when external strain is sensed on said at least one seat, and wherein said strain gauge being operable for ~~exhibiting varying electrical~~ converting said resistance ~~from said external strain~~ into electrical energy.

74. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65, wherein said at least one computerized system further comprises a control module, said control module being configured for identifying each seat for which said weight measurements are taken and for activating said airbag system corresponding to each said seat for which said weight measurement exceed a minimum weight threshold value generally corresponding to the weight of at least a small child.

75. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 74, wherein said minimum threshold value is ~~at least 20 pound~~ comprises at least a minimum weight acting on said at least one seat.

76. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim ~~74~~ 65, wherein said at least one computerized system ~~control module~~

further configured for converting analog signals to digital signals corresponding to said occupant's weight.

77. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim ~~76~~ 65, wherein said ~~control module~~ at least one computerized system further configured to convert said digital signals to binary signals corresponding to ~~communication signals for~~ said operating weight value.

78. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim ~~74~~ 65, wherein said ~~central processing unit~~ at least one computerized system in communication with at least a read only memory device being configured with a basic input-output system ~~being operable~~ in association with at least a storage device, ~~wherein said central processing unit~~ further comprising at least a random access memory, ~~and wherein said read only memory being~~ each memory operatively configured with a software program ~~responsive to said random access memory~~, said random access memory being operatively configured for accessing said weight measurements ~~and in communication with said EPROM~~.

79. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65, wherein said deployment unit further comprises at least one of: a combustion chamber operatively connected to a canister of igniting gas, a microprocessor being configured for receiving ~~said~~ an operating weight value, ~~said~~ a microprocessor electrically connected to ~~said~~ an accelerometer, ~~said~~ an accelerometer further comprising at least a piezoelectric ~~coil~~ elements~~,~~ ~~being~~ communicatively connected to ~~said~~ a canister of igniting gas, a collision sensor ~~and~~ operatively connected to a processor in communication with ~~said~~ a combustion chamber.

80. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 79, wherein said canister of igniting gas being configured with at least a microprocessor, said microprocessor being electrically connected to at least a relay in association with at least one of: a gas release valve, ~~relay and~~ an igniter, said relay in communication with said gas release valve ~~relay being operable~~ for releasing proportionate amount of gas into said combustion chamber, ~~and~~ said igniter operatively configured for igniting said released gas for said airbag deployment.

81. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim ~~80~~ 79, wherein said accelerometer further comprises at least one piezoelectric elements comprising at least one of: at least a crystal, ~~comprising~~ at least a coil, said piezoelectric elements being communicatively connected to at least a mass, said mass being in ~~contact~~

communication with at least a spring, said spring being operatively connected to at least a sliding pot, said sliding pot ~~being~~ operatively configured to adjust an opening in said combustion chamber for the release of igniting gas thereto, for ~~to deploy~~ said at least one airbag.

82. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim ~~79~~ 65, wherein said weight sensing unit further configured with at least a microprocessor ~~further configured~~ to enable at least one of: translate said operating weight value into electrical energy ~~being operatively~~ proportionate to said weight measurements, controlling said electrical energy ~~being operable for energizing said~~ to energize at least one ~~crystal~~ accelerometer comprising at least a piezoelectric element, ~~each said energized crystal being configured for~~ translating said electrical energy into mechanical energy, ~~said mechanical energy~~ displacing ~~said~~ at least a mass and correspondingly compressing ~~said~~ at least a spring~~, said~~ in communication with at least a sliding pot correspondingly according ~~being responsive to said spring compression corresponding~~ to said weight measurements said sliding pot in association with said airbag assembly.

83. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 80, wherein said accelerometer further configured to transmit a first signal corresponding to said operating weight value to ~~said canister~~ at least a microprocessor associated with said canister of igniting gas, said ~~canister~~ microprocessor being configured to process said first signal and deliver to said ~~gas release valve~~ relay a second signal corresponding to a specific volume of gas to be released into said combustion chamber, said specific volume of gas further comprising the amount of ~~said~~ igniting gas ~~being~~ required ~~to generate~~ for said deployment force and acceleration for said at least one airbag inflation being correspondingly proportionate to said weight measurements.

84. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 83, wherein said accelerometer further comprises at least one piezoelectric element ~~crystal, each said at least one piezoelectric crystal being operatively connected to a said mass in communication with said spring, said spring~~ operatively connecting said sliding pot to said combustion chamber for the ~~expansion~~ release of igniting gas into said at least one airbag, wherein said airbag is configured to provide a proportionate inflation pressure when a collision sensor senses a collision has occurred of a severity requiring airbag deployment.

85. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65 further comprising a collision sensor operatively connected to said at least one computerized system.

86. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65 further comprising a collision sensor operatively connected to said deployment unit.

87. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 85, wherein said collision sensor being operable ~~with~~ to sense collision, and said at least one computerized system further configured for controlling the deployment of airbags in response to said collision severity threshold.

88. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 87, wherein said collision severity further comprises a threshold comprising at least a collision substantially equivalent to said vehicle traveling at least between ~~about~~ 10 m.p.h. and 15 m.p.h. and hitting at least a substantially rigid object.

89. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65, wherein said at least one computerized system ~~being~~ further configured to store said weight measurements and to erase said weight measurements for said at least one seat when said occupant leaves said at least one seat, and wherein (a) at least a new weight measurement is being generated ~~when said occupant or a~~ responsive to said weight of said new occupant ~~occupies~~ sitting on said at least one seat.

90. Cancelled.

91. Cancelled.

92. Cancelled.

93. (Currently Amended) The vehicle occupant seat detection means and weight responsive classification system of claim 65, wherein said weight sensing unit further comprises a detection apparatus ~~being~~ operatively configured for detecting weight and for measuring weight capacity of at least 1 pound.

94. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65 further comprising signal amplifier apparatus being configured to amplify at least one of: analog signal, digital signal, ~~and~~ binary signals, wherein said at least one signal is provided for controlling said supplemental restraint system.

95. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65 further comprising a transient voltage suppressor communicatively connected to said at least one computerized system, said transient voltage suppressor being configured

to filter out at least one of: transient spikes, transient force, travelling current, operable for preventing abnormal readings or abnormal communication signals to said airbag assembly.

96. Cancelled.

97. Cancelled.

98. Cancelled.

99. Cancelled.

100. Cancelled.

101. Cancelled.

102. Cancelled.

103. Cancelled.

104. (Currently Submitted) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65, wherein said weight sensing unit being disposed between said ~~at least~~ seat mounting structure and the floor of the vehicle.

105. (Currently Amended) A ~~The~~ vehicle occupant seat detection means and weight responsive ~~classification~~ system; ~~of claim 65, wherein said weight sensing unit operatively configured with said at least one computerized system being operable for controlling the resistance of said supplemental restraint system~~ comprising: at least a seat disposed with a mounting structure; at least a weight sensing unit disposed between said seat mounting structure and the floor of a vehicle operable for providing at least a first sensor signal; at least a collision sensor configured for providing at least a second sensor signal; at least a computerized system comprising a module for receiving said first and second sensor signals respectively; at least a supplemental restraint system; and wherein said first and said second sensor signals comprise weight measurements and collision force measurements being controllable by said computerized system for proper deployment of said supplemental restraint system.

106. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65, wherein said at least one computerized system further operable for calculating a restraint value ~~of~~ for said supplemental restraint system based upon at least the weight value of said at least one seated occupant and/or at least a collision force value according to the vehicle speed.

107. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim ~~65~~ 105, wherein said supplemental restraint system further configured for

controlling ~~the~~ airbag tension when a collision is sensed.

108. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65, wherein said weight sensing unit further operable for converting said occupant's body weight into electrical energy.

109. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65, wherein said weight sensing unit further comprising at least a strain gauge being disposed in a load cell.

110. (Currently Amended) The vehicle occupant seat detection means and weight responsive ~~classification~~ system of claim 65, wherein said load cell further comprising at least a silicon substrate.

111. (New) The vehicle occupant seat detection means and weight responsive system of claim 105, wherein said weight sensing unit further comprises apparatus for detecting seat occupancy, in communication with said computerized system operable for controlling the resistance of said supplemental restrain system.

ARGUMENTS:

The following remarks are respectfully submitted in response to the Office Action dated August 3, 2010. Claims 65-89, 93-95 and 102-110 are pending in the present application.

Claims 65-89, 93-95, and 104-110 are in the application. The Examiner remarks that Applicant is unfamiliar with the patent prosecution procedures. This remark is rebuked on the grounds that the history of this application reveals that Applicant had employed the services of two patent law firms and that the Examiner still found their services to the Applicant to be unprofessional and also classified them unfamiliar with patent prosecutions and procedures. Furthermore, the history of this application reveals that the Examination and prosecution has been unfairly handled by the Examiner under the pretext of Applicant unfamiliarity with the patent prosecution procedures and patent systems procedures. A fair and proper examination of this application is respectfully requested.

The specification submitted on May 17, 2010 was objected to under 35 U.S.C 132(a) for introducing new matters in the application. Regarding the specification, Applicant respectfully traverses the Examiner's objection on the grounds that all subject matters disclosed therein are found in the specification and also in the priority applications. Further, the Examiner's objection of the Field of the invention is traversed on the grounds of right in view of the filing of the RCE on 08/16/2007 and 11/24/2009 and further in view of the disclosure in the priority documents. Support for the field of the invention and background of the invention could be found within the 56 pages of the marked copy, which is in record with the documents as filed on 10/07/2003 with the present application. Applicant has now filed another RCE under 37 CFR 1.114. These and all subject matters deemed by the Examiner as new matter should now be entered. Reconsideration is respectfully requested.

All rational, reasoning, and support for the present invention are seen within the specification for the present invention and also within the specifications for the priority applications. The claimed dependency has been reviewed in light of the Examiners comments, and it is pointed out in the documents that the claims as set forth in the specification is correct and that any inconsistency set forth in the application data sheet relative to the specification should be disregarded. All subject matters drawn to the field of the invention and background of the invention are drawn solely from the originally filed specifications, which also include priority applications.

Claims 105 and 107 stand objected under 37 CFR 1.75, as being of improper dependent form. Regarding claims 105 and 107, Applicant has respectfully amended the claims according to the Examiner's suggestions. Reconsideration is respectfully requested.

Claims65-89, 93-95 and 104-110 stand rejected under U.S.C 112 first paragraph as failing to comply with the enabling disclosure.

Regarding claims 65-89, 93-95, and 104-110, Applicant respectfully traverses these rejections on the grounds that one of ordinary skill would understand that adjusting a deployment unit includes adjusting a supplemental restraint device comprising one or more airbag system configured with a sliding pot, a release valve, a relay, a canister of igniting gas, an igniter, and a combustion chamber, operable to inflate at least an airbag. The Examiner's assertions that piezoelectric accelerometer only produces movement on the micrometer scale is moot. One of ordinary skill would understand that piezoelectric accelerometer would produce voltage above a micrometer scale, capable for operation to control the sliding pot for the release of canister igniting gas to deploy the airbag proportionately. Reconsideration is respectfully requested.

The Examiner's assertion that the sliding pot would not produce appreciable difference is rebuked because one of ordinary skill would understand that the "Energy" voltage dependency would enable the sliding pot to open to appreciable area for the release of appreciable volume of inflatable gas that would produce appreciable deployment force/pressure to safely keep the vehicle occupant on the seat without causing any further injury to the occupant. The history of the present application reveals that the Examiner has routinely recite his understanding of art devices and has failed to acknowledge the innovativeness of the present invention, even to the Examiner's own admissions in the office communication. The Examiner's statement that the sliding dashpot would produce negligible change in inflation pressure is dictating, and is an indication of the lack of understanding to Applicants inventions and/or inventive steps. Furthermore, the Examiner's assertion that the subject matter is enabled without showing or referencing the specification further shows the Office lack of effort to revisit priority applications in record associated with the current application. The Examiner's further assertions that erasable programmable read only memory is not adequately disclosed is rebuked on the grounds that the Examiner has failed to revisit the adequate information regarding priority applications data in record.

The erasable programmable read only memory, as disclosed in the specification, would be understood by one with ordinary skill in the art that it comprises a memory. The Examiner further ignored Applicants mentioned of classification system and Applicant has stated in present invention and priority applications that there is a method of correcting occupant's data. Applicant's definition of correcting occupant's data is not limited to data about a changing occupant, but further includes sensor information regarding a seat occupant. The classification also includes vehicle occupant characteristics, which are determined, and which include occupant's weight, seatbelt usage, and new data about a new occupant on the seat, and which is reconfigured to ensure proper airbag deployment pressure. Once the seat occupant's weight is determined, the supplemental restraint system is adjusted for airbag deployment proportionate to the weight measurement. The supplemental restraint system is controlled based on the weight assigned to the computerized system and/or the body movement of the occupant. The weight-sensing unit monitors and measure the weight force exerted on the seat bottom to determine the actual weight of the vehicle occupant and the movement of the occupant within the vehicle seat thereafter, which means that disclosed embodiment is capable of classifying occupants according to their position, seatbelt usage, and weight. If the vehicle occupant is replaced and another occupant is sited on the said seat, a correction factor applied to characterize the new information and/or occupant's weight value such that the new occupant can be properly protected against further injuries. Reconsideration is respectfully requested.

The Examiner rejected claims 65-89, 93-95, and 104-110 under 35 U.S.C. 112, first paragraph for failing to comply with the written description requirement.

Regarding claims 65-89, 93-95, and 104-110, these rejections are respectfully traversed on the same grounds mentioned above. The Examiner has ignored the languages in the art, which have the same and equal meanings and/or equal to their equivalents. The Examiner has failed to identify Applicant's mention of a computerized system, which is not limited to software, hardware, computer system, processors, CMOS, address line, CPU, or memory, but further include apparatus operable to run programs and process data for various applications within the designed purpose of Applicant's invention. Emulator falls within art definition of a computerized system. Reconsideration is respectfully requested.

Claims65-89, 93-95 and 104-110 stand rejected under U.S.C 112 second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regard as the invention.

Regarding claims 65-89, 93-95 and 104-110, Applicant respectfully traverses the office rejections. One of ordinary skill would understand that the deployment unit as disclosed, and the piezoelectric accelerometer as presented in the specification teaches an analogue to digital device capable of movement micrometer scale. The office mentioned of a sliding dashpot is not equivalent to Applicant disclosure of a sliding pot, since a sliding dashpot would require the dashpot to be mounted on the dash, whereas one of ordinary skill would understand that the sliding pot is a structure for the deployment unit. Regarding claim 65, Applicant has amended the claimed subject matter. Reconsideration is respectfully requested.

Regarding claim 68, one of ordinary skill would understand that advanced classification system would require a device that is operable to protect occupant's weight data against transient pikes and pumps. One of ordinary skill would understand that this would require a memory device that is erasable, programmable, and/or operable for reading only. Further, one of ordinary skill would understand that the EPROM is a memory chip comprising electronic components through which a program, data or both can be stored. The EPROM is further driven by a computer apparatus, which may include a CPU and/or CMOS. The office has failed to identify this disclosure in priority applications. Reconsideration is respectfully requested.

Regarding claims 65-89, 93-95 and 104-110, Applicant further submits that the foregoing rejection of claims 65-89, 93-95 and 104-110 are moot in light of the foregoing amendments. Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

Claims 65-89, 93-95 and 104-110 stand rejected under U.S.C 103(a) as being unpatentable over Steffens et al.,(U.S Pat. Num. 5,413,378) in view of turner et al., (U.S Pat. Num.5,956,703, and further in view of Mehney et al (U.S Pat. Num. 6,039,344.)

Regarding claims 65-89, 93-95 and 102-110, Applicant respectfully traverses the office rejections.

The Examiner admits that Steffens, Jr. et. al. do not teach the features of claim 65. Applicant is not sure exactly how the Examiner concludes that features of claim 65 would have been obvious from the teaching in Steffens, Jr. et. al. Steffens, Jr. et. al. teach that a regulating means including means for determining in which of a plurality discrete occupant weight ranges the occupant sensed weight falls, means for determining in which of a plurality of discrete occupant position ranges the occupant's sensed position falls, said control means selecting one of a plurality of a discrete control zones dependant upon both said determined occupant discrete weight range and said determined occupant discrete position range of the occupant and providing said control signal based on the selected one of said control zone is used to elaborate further deployment force control deficiencies. This teaching of using discrete weight ranges to determine airbag deployment pressure does not in any way suggest airbag deployment force/pressure that and acceleration that is proportionate to the weight measurement of the vehicle occupant.

The invention as defined by claim 65 would not have been suggested by the teaching of Steffens, Jr. et. al.

The Examiner further rejected claims 65-89, 93-95, and 104-110 under 35USC 103 as being over Steffens, Jr. et. al., in view of Turner et. al. Applicant respectfully traverses.

The invention as defined in claim 65-89, 93-95, and 104-110 would not have been suggested for the reasons given above with regards to claim 65.

The Examiner further rejected claims 65-89, 93-95, and 104-110 under 35USC 103 as being unpatentable over Steffens, Jr. et. al., in view of Turner et. al., and further in view of Mehney et. al. Applicant respectfully traverses. The Examiner further claims to have done prior art search, but fails to provide other prior art documents which are public documents and within USPTO database under application serial number 08/953, 503 filed 10/17/1997 by the inventor of current application, provisional application serial number 60/054,435 filed 07/14/1997 by the inventor of current application, provisional application serial number 60/079,496 filed 03/26/1998 by the inventor of current application. These applications where also made public in foreign countries "PCT/US99/06666." The teachings of load cell and strain gauge are seen in the entirety of these documents. As such, Mehney et. al. do not qualify as prior art to this application under 35 USC 103(a). Mehney et al. is a U.S patent, which did not have a filing date earlier than the publications of the above mentioned applications. Applicant's original and parent applications were available with the U. S. Paten Office before the filing of Mehney et al. As such, Mehney et al. would not qualify as priority art to this application under 35 USC 103(a), and would not have provided any motivation at the time of the filing of current application. In addition, the assignee for Mehney et al. was in possession of Applicant works at the time of Mehney et al. filings and did not acknowledge the fact in the filing documents. Applicant had earlier submitted to the Examiner, the communication that took place between Applicant and TRW "See Application Serial Number 11/585,274." Reconsideration is respectfully requested.

Steffens, Jr. et al. Turner et al., and Mehney et al. either by themselves or in combination with each other do not disclosed every element of claim 65. As such, a combination of Steffens, Jr. et al., Turner et al., and Mehney et al. does not establish a prima facie case of obviousness. (MPEP 2143)

The Examiner further stated that the combination of Steffens, Jr. et al. and Turner et al. failed to disclose all the limitation of claim 65 but that further combination of Mehney et al. discloses a weight sensor positioned between a seat mounting structure means and the floor means. These rejections are respectfully traversed. Applicant respectfully submits that these rejections are moot because all cited art of record failed to disclose all the limitations of claim 65. MPEP 2142 states the following: The examiner bears the initial burden of factually supporting any Prima Facie Conclusion of obviousness. If the examiner does not produce a Prima Facie case, the applicant is under no obligation to submit evidence of non obviousness. In addition, MPEP 2141.02 states the following: Ascertaining the difference between the prior art and the claims at issue requires interpreting the claim language, and considering both the invention and prior art references as a whole. The Examiner notes that patent numbers 5,413,378, 5,956,703, and 6,039,344 disclose some elements of the limitation of claim 65 but each did not disclose every element of the limitation of claim 65. However, the Examiner further failed to conclude that U.S Patent Number 6,039,344 is not a qualified prior art for this application.

Claims 65-89, 93-95, and 104-110 have been amended to put the application on condition for immediate allowance. Reconsideration is respectfully requested.

Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for immediate allowance. Favorable reconsideration and prompt allowance of claims 65-89, 93-95, and 104-110 are earnestly solicited. Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is respectfully invited to contact the Applicant at the telephone number set forth below.

Respectfully

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COMMISSIONER FIELD OF THE INVENTION

The present invention relates to vehicle occupant seat detection device and weight responsive classification system.

BACKGROUND OF THE INVENTION

Weight sensing systems for use with supplemental restraint devices are well known in the art. One such weight sensing system includes sensors positioned in the sitting surface of a seat. These sensors are engaged only when the seat cushion is deflected.

Disclosed embodiments comprise weight sensing unit disposed beneath the vehicle occupant seat detection and weight responsive classification system.

SUMMARY OF THE INVENTION

Disclosed embodiments comprise a supplemental restraint system comprising of one or more weight sensing units which are being operatively secured beneath one or more seats in a vehicle, the units being communicatively connected to the vehicle's supplemental restraint system via a computerized system being configured for controlling the deployment force and acceleration used to inflate airbags corresponding to each seat occupied by an occupant. The deployment force for each airbag is determined proportionately based on the weight of the occupant occupying the corresponding seat.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a diagrammatic view of an occupant in a seat in a vehicle employing an embodiment of the present invention.

Figure 2 shows a cross-sectional side view of one embodiment of a load cell as a weight sensing unit according to the present invention.

Figure 3 shows a diagrammatic view of an embodiment of a computerized system according to the present invention.

Figure 4 shows a diagrammatic side cut-away view of an embodiment of an airbag system according to the present invention.

Figure 5 shows another embodiment of the present invention further comprising a smart seat belt system.

Figure 6 shows another embodiment of a weight sensing unit comprising an inflatable or deflatable bag and a device for recording and transmitting values for inflation or deflation of the bag.

Figure 7 shows a diagrammatic view of the present invention comprising seat belt sensors and airbag sensors for controlling the direction of airbag deployment away from occupant's head; and

Figure 8 shows a cross sectional view of one version of an airbag used with the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

The supplemental restraint system **10**, according to the present invention comprises one or more weight-sensing units **12** operatively secured beneath one or more seats **14** in a vehicle (not shown), the units being communicatively connected to the vehicle's supplemental restraint system via a computerized system **16** that intelligently controls the deployment force and acceleration used to inflate airbags **18** corresponding to each seat occupied by an occupant **20**. The deployment force for each airbag **18** is determined proportionately based on the weight of the occupant **20** occupying the corresponding seat. Other features of the present invention may include the storage and use of other information regarding occupants in the vehicle, such as whether seatbelts **22** are buckled and whether arms and legs are in proper safety enhancing positions.

Figure **1** shows an occupant **20** sitting in a seat **14**. In one embodiment, the weight-sensing unit **12** comprises a load cell **24** secured beneath the seat **14**. In other embodiments, more than one load cell **24** is secured beneath the seat **14**. Each load cell **24** comprises one or more strain gauges **26** that are configured to sense a force applied to them when an occupant **20** sits on the seat **14**. The strain caused by the force of the occupant **20** on the seat is measured by the gauge **26** which delivers an electric line signal to the computerized system **16** for processing in accordance with the present invention.

In one embodiment, the computerized system **16** comprises a control module **28** electronically connected to a central processing unit (CPU) **30**. A control module **28** receives the electric line signals from each load cell **24** and identifies particular seats **14** in the vehicle from which signals are received. As a result, in one embodiment, the control module **28** categorizes data received as pertaining to functionality of one or a set of airbags **18** corresponding to a particular seat **14** in the vehicle. Similarly, in other embodiments, the control module **28** categorizes data as being insufficient for activating one or a set of airbags **18** corresponding to a seat **14** because there is no occupant **20** for that seat or because a small child is the occupant. In yet other embodiments, the control module **28** will only activate airbags **18** for a seat **14** in which the load cells **24** detect an occupant **20** over about 20 lbs.

In one embodiment, the control module **28** receives electric line signals from load cells **24** as analog signals. In other embodiments, the control module converts analog signals it receives into digital signals. In yet other embodiments, the digital signals are converted into binary signals for using a plurality of transistorized switches (not shown) for processing weight value data and communicating such data to the various electronic and computer components in the system **10**.

The control module **28** delivers data from load cells **24** to the CPU **30** comprising read only memory (ROM) **32** that has a basic input output system (BIOS) **34**. The CPU **30** also comprises random access memory (RAM) **36** used by at least one software program **38** in the CPU **30** configured for calculating occupant weight values. The BIOS **34** stores the load cell data as a weight measurement in an address line **40** in the BIOS. The RAM **36** runs the software program **38** to access the address line **40** to obtain the weight measurement and communicates it to the software program **38** in the CPU **30** that calculates and confirms the weight measurement, and determines the operating weight value for the occupant **20** in each seat **14**.

The operating weight value is then communicated to the airbag system **42** corresponding to the seat **14**. In one embodiment, the airbag system **42** comprises one or more airbags **18** operatively connected to a deployment unit **44**. In other embodiments, the deployment unit **44** comprises a combustion chamber **46** that is operatively connected to a canister **48** of igniting gas. In the present invention, the airbag system **42** further comprises a microprocessor **50** electronically connected to an accelerometer **52** that is electrically connected to a canister microprocessor **54** and operatively connected to a sliding pot **56**. The canister microprocessor **54** is electrically connected to a gas release valve relay **58** and an igniter **60**. The sliding pot **56** is operatively connected to the combustion chamber **46**. The release valve relay **58** is operatively connected to a release valve **62** between the gas canister **48** and the combustion chamber **46**.

The operating weight value is received within the airbag system **42** by the microprocessor **50**. The microprocessor **50** delivers a signal corresponding to the operating weight value to the accelerometer **52**, which translates that signal to a corresponding proportionate electric current that energizes the piezoelectric crystals **64** in the accelerometer **52**. The accelerometer comprises at least a coil being electronically configured for receiving the operating weight value for the seat and for adjusting the deployment unit within the airbag system to deploy at least one airbag with a deployment force and acceleration for airbag inflation that are proportionate to the weight measurements. The piezoelectric further comprises energy harvesting methods of converting other forms of energy to electrical energy. In this way, the accelerometer is used in reverse to its normal function. The energy from the crystals **64** is thus also proportionate to the operating weight value, which represents the weight of the occupant **20** in the seat **14**. The electrical energy from the crystals **64** is converted to mechanical energy and employed to displace the mass **66** in the accelerometer **52** the distance D directly related to the crystal energy. The mass **66** abuts a spring **68** which is correspondingly compressed by the displacement of the mass an amount directly related to the distance D. The spring compression is thus directly related to the crystal energy which is directly related to the operating weight value which is based on the weight of the occupant **20** in the seat **14**.

The compression of the spring **68** is the culmination of translating the electrical energy of the current applied to the crystals **64** into the mechanical energy applied to the sliding pot **56** to adjust the opening in the combustion chamber **46** for the gas to expand into the airbag **18** when ignited. In conjunction with this adjustment, the canister microprocessor **54** receives the same signal from the microprocessor **50** that is delivered to the accelerometer **52** that corresponds to the operating weight value. The canister microprocessor **54** utilizes this signal to communicate to the gas release valve relay **58** a specific volume of the gas (not shown) to be released through the release valve **62** into the combustion chamber **46**.

The sliding pot **56** position and the volume of the gas released are calibrated together such that the particular position and the particular volume released generate a specific deployment force and acceleration when the gas is ignited by the igniter **60** when the igniter receives a signal from a collision sensor **70** that a collision has occurred that requires airbag deployment. Because each of the gas release valve relay **58** and the accelerometer **52** (which operatively adjusts the position of the sliding pot **56**) are operated according to signals corresponding to the operating weight value that is based on the weight of the occupant **20** in the seat **14**, the deployment force then corresponds directly to the weight of the occupant in the seat as well in order to optimize the safety of airbag deployment and reduce injuries to occupants as a result.

In one embodiment, a collision sensor **70** signals the control module **28** when a minimum threshold collision severity has occurred in order to start the supplemental restraint system process according to the present invention. In other embodiments, the minimum threshold collision severity comprise a collision substantially equivalent to a vehicle traveling between about 10 m.p.h. and about 15 m.p.h. and hitting a substantially rigid wall (not shown). In yet other embodiments, the collision sensor **70** signals the canister microprocessor **54** directly or the igniter **60** directly to initiate the ignition of the proportionate volume of gas released into the combustion chamber **46**. In the latter case, the system **10** of the present invention prepares the sliding pot **56** position and volume of igniting gas in advance when the operating weight value is determined from the weight of the occupant **20** on the seat **14**. In yet other embodiments, the collision sensor **70** only signals a collision event has occurred when the collision exceeds predetermined speed and collision force thresholds for deployment of the airbags **18**, so that deployment depends on collision severity.

In one embodiment, the ROM **32** comprises a portion that is erasable and programmable (EPROM). The EPROM erases the data in the address line **40** in the BIOS **34** for a particular seat **14** every time an occupant **20** leaves a seat. The EPROM then replaces the data with new data when the occupant or a new occupant takes the seat. The EPROM includes an emulator comprising a housing operatively connected to the EPROM header. The EPROM header is communicatively connected to a circuit board in conjunction with a microprocessor emulator. The housing further comprise data select circuits configured to hold the occupants weight data. A switch on the housing is configured to be turned to place the device in programming mode. The emulator is being programmed for sending data through the EPROM socket on the circuit board via the microprocessor emulator. A switch on the housing is turned to place the device in read-only mode to simulate the EPROM.

In one embodiment, the system **10** of the present invention is used in conjunction with a smart seatbelt system **72**. In other embodiments, the smart seatbelt system **72** will prevent the vehicle from starting unless one or all occupants **20** are wearing their seatbelts **74**. If the occupants **20** decide to put on the seatbelts **74** simply to start the vehicle, as soon as the seatbelts are disconnected, the engine (not shown) will shut off. As a result, the engine will stay running only when all of the seatbelts **74** are worn in all of the occupied seats **14**. In another embodiment, the smart seatbelt system **72** will not allow disconnection of the seatbelt **74** in any way or form unless the engine is first turned off. In this way, a seatbelt processor **76** in the CPU **30** will monitor seatbelt disconnection processes and disable the vehicle's starting means **78** when an occupant **20** is not belted. In yet other embodiments, if a driver decides to stop and pick up another occupant with the engine running, or if the occupant enters the car and fails to put on the seatbelt, the seatbelt processor **76** will deliver a signal to the vehicle starting means **78** to shut the vehicle engine off. The vehicle will only be able to restart when the occupants buckle their seatbelts.

The load cells **24** or other sensors (not shown) in the vehicle can measure additional data relevant to occupants **20** in a vehicle. For example, in one embodiment, sensors are installed inside the vehicle in various locations to sense the position of the occupants **20** within their respective seats **14** or the positions of the respective occupant's arms and legs, such as propped up on the dashboard (not shown). This data may be processed and stored in the CPU **30**. In other embodiments, the CPU **30** may signal a driver of the vehicle regarding unsafe conditions or behavior resulting from different occupant's unsafe body positions. In yet other embodiments, such signals comprise a verbal report. In yet other embodiments, the vehicle is disabled after a preset time until such unsafe behavior or positioning is corrected.

In one embodiment, a weight sensing unit **12** alternative configuration comprises a pressurized, inflatable or inflated bag **80** mounted in the cushion **82** of the seat **14** or beneath the seat. When an occupant **20** occupies a seat **14**, the weight of the occupant will either displace a certain amount of the stored pressure in such bag **80** to a relay valve **84** or initiate the inflatable bag **80** to inflate that specific amount of air to the relay valve **84** that will record the displacement or inflation, as the case may be, as the occupant's weight value. The displaced pressure or the inflated air pressure is the maximum pressure that, when the collision sensor **70** senses a collision, it will signal the accelerometer **52** which then initiates the deployment speed and force of the airbags **18** to correspond to the displaced pressure or the inflation pressure from the bag **80**. The displaced or inflation pressure is the maximum pressure for the maximum acceleration in deployment force of the airbags **18** that may be deployed when the collision sensor **70** senses a sufficient collision force. When the occupant **20** leaves the seat, the weight removed will displace stored pressure or allow reinflation of a deflated bag **80** that is equal to the weight value of the occupant **20**. If the weight value matches or exceeds the stored pressure, then the acceleration and deployment force will have a constant value when a collision is sensed. The displacement or inflation recorded by the relay valve **84** will be transformed into a weight unit for the CPU **30** to recognize. The CPU **30** will then carry on the calculations and computations according to the present invention the same way as for the conventional load cell **24** configuration. In light of the foregoing, alternative means for measuring weight values and communicating them to the CPU **30** are also within the scope of the present invention, which is not intended to be limited by the specific description of a load cell **24** or the above alternative inflatable bag **80** configuration therefor.

In operation, when the ignition switch (not shown) for the vehicle is turned on, an electrical current of 5 milivolts will power the load cell **24** prior to the CPU **30**. When an occupant **20** occupies any of the seats **14** in the vehicle, the load cell **24** or cells for each seat **14** will read the energy from the weight input from the occupant **20** in the seat **14** to communicate with the CPU **30** to enable data processing and computation. The CPU **30**, once powered, runs functions that check all of the hardware components functionality to ensure that they are functioning properly. The CPU **30** comprises a computer chip motherboard (not shown) that contains the CPU operating components **32**, **34**, **36**, **76**, etc. Once the CPU **30** conducts its system functionality check, a boot program (not shown) then checks to see if any occupants **20** have occupied any of the seats **14**. The boot program does this by searching for signals output from the load cell **24**. The boot program then sends the information from the load cells **24** to the address line **40** in the BIOS **34**. The 5 milivolt current from the power source (not shown) of the vehicle is used to generate the electric line signals that are communicated back and forth between the components of the present invention. Components such as the strain gauges **26** and the accelerometer crystals **64** being electrical resistance elements, the current used to convey the electric line signals is thus manipulated as a result of the increase or decrease in the resistance of these elements when current or strain is applied.

In one embodiment, a load cell **24** comprises a corrosion resistant, high alloy steel construction. In yet other embodiments, a load cell **24** comprises a weight measuring capacity of up to about 1,000 lbs. In yet other embodiments, a load cell **24** comprises machined, high steel beams **86** having strain gauges **26** secured thereto. In yet other embodiments, the strain gauges **26** comprise electrical resistance elements sealed with a sealant (not shown) to prevent moisture or contaminants from disrupting strain measuring functions.

In one embodiment, a control module **28** comprises a silicon control rectifier that manages flow of data to the ROM **32** in the CPU **30**. In other embodiments, the data comprises occupant weight information and other in-vehicle information regarding the occupant **20**. The CPU **30** comprises a ROM **32** having EPROM capabilities as well as a BIOS **34**, and the CPU **30** further comprises RAM **36** and a software program **38** running within the RAM. The CPU **30** records information regarding the occupant **20**, including how the occupant changes positions or shifts weight in the seat **14**. The BIOS **34** comprises the basic control over the load cell **24** data stored in the ROM **32**. The ROM contains a special chip (not shown) for the CPU **30** that contains instructions and other information that is not erasable or reprogrammable during the life of the CPU. The RAM **36** comprises the primary memory storage for running the software program **38** that accesses the occupant's information and allows the CPU **30** to calculate the operating weight value, among other data for use in accordance with the present invention.

In one embodiment, a signal amplifier **88** is employed for amplifying the electronic signals delivered from one component of the system **10** to the others.

Although the present invention is designed for use with a supplemental restraint system that utilizes a combustible gas for generating the force and volume for inflating an airbag, it is within the scope of a person or ordinary skill in the art to modify the present invention for use with a standard supplemental restraint system that utilizes a sodium azide/potassium nitrate reaction for producing hot and fast blasts of nitrogen gas to inflate the airbag. The solid propellant from the standard supplemental restraint system can be volumetrically controlled for release into a combustion chamber in amounts required for a deployment force and acceleration corresponding to the weight of an occupant **20** in a seat **14**.

In one embodiment, electronic line signals are delivered and received as binaries that communicate between transistorized switches (not shown) that read the **1**s and **0**s as "off" and "on" as required for the components of the present invention to effectively communicate data back and forth. In other embodiments, a transient voltage suppressor **90** may be located between the control module **28** and the address line **40** within the CPU **30**. In the event of a transient voltage spike to the system **10** which would cause abnormal readings or reactions for the RAM **36**, a voltage suppressor **90** may be utilized to filter out transient spike phenomenon and ensure that accurate weight values are retained. With regard to binary signals, an "off" signal represents an open circuit and an "on" signal represents a closed circuit. Binary signals will logically be used to tell the CPU **30** the number of switches that need to be turned off and on to influence accurate responses to the operating weight values. Also, use of binaries will enable to the CPU

30 to activate devices that will initiate controlled energies toward the smart deployment of airbags **18** without causing injuries to occupant **20**. The CPU **30** uses logical functions to timely open and close all circuits within the transistorized switches. The logic depends on the switches to open and close on time for the system **10** to know the weight of the occupant **20** before activating the deployment force of the airbag **18**. The binary number system will allow the CPU **30** to do any other form of math. Everything in the CPU **30**, math, words, decimal numbers and software instructions, will communicate in the binary numbers. This means that the transistorized switches can do all types of manipulation. The clock (not shown) inside the CPU **30** regulates how fast the CPU should work, or how fast the transistorized switches should open or close. The faster the clock ticks or emits pulses, the faster the CPU will work. The speed is measured in gigahertz, which is billions of ticks per second. Electrical current passing through one transistorized switch may be used to control another transistorized switch, in effect turning the switch on and off to change what the second transistorized switch represents as a logic gate.

While various specific embodiments of the invention have been shown and described for purposes of illustration, the protection afforded by any patent which may issue upon this application is not strictly limited to the disclosed embodiments, but rather extends to all structures, arrangements and methods which fall fairly within the scope of the claims which are appended hereto:

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ABSTRACT

A restraint system for a vehicle comprises a weight-sensing unit mounted to one or more seats and positioned between the seat mounting frame and the floor means of the vehicle for sensing the weight of a sitting occupant and for classifying the occupant accordingly, a computerized system for calculating an operating weight value corresponding to the classified weight value, and an airbag system comprising one or more airbags and a deployment unit configured to inflate the airbags with a deployment force and acceleration that is proportionate to the operating weight value when a sufficient collision force is sensed above a predetermined collision force value by a collision sensor.